

Claims

What is claimed is:

- [c1] A method for processing seismic data, comprising:
 - prestack depth migrating the seismic data to generate common image gathers using an initial velocity-depth model;
 - selecting at least one horizon in the migrated seismic data;
 - performing residual migration velocity analysis in the depth-offset domain at the least one selected horizon; and
 - updating the velocity-depth model based on the residual migration velocity analysis.
- [c2] The method of claim 1 wherein the prestack depth migration comprises Kirchhoff integral depth migration.
- [c3] The method of claim 1 wherein the residual migration velocity analysis comprises:
 - applying a perturbation to an initial value of slowness used in the migration;
 - applying a residual moveout in a common image gather;
 - determining flatness in a common image gather at a selected horizon; and
 - repeating applying the perturbation, applying the residual moveout and the determining the flatness until a selected range of perturbation is covered.
- [c4] The method as defined in claim 3 wherein the determining the flatness comprises determining a semblance between traces in the common image gather, wherein a maximum semblance corresponds to a maximum flatness.
- [c5] The method of claim 4 wherein the updating the velocity-depth model comprises replacing migration velocities with velocities obtained from the determining semblance of the common image gather and updating depth using the velocities obtained from the determining semblance.
- [c6] The method of claim 1 further comprising repeating the residual migration velocity analysis in the depth-offset domain on a deeper horizon than the at least one selected

horizon based on the updated velocity depth model, and repeating the updating the velocity-depth model based on the repeated residual analysis.

- [c7] A computer program stored in a computer readable medium, the program having logic operable to cause a programmable computer to perform steps, comprising:
prestack depth migrating seismic data to generate common image gathers using an initial velocity-depth model;
selecting horizons in the stacked migrated seismic data;
performing residual migration velocity analysis in the depth-offset domain; and
updating the velocity-depth model based on the residual migration velocity analysis.
- [c8] The program of claim 7 wherein the prestack depth migrating comprises Kirchhoff integral depth migration.
- [c9] The program of claim 7 wherein the residual migration velocity analysis comprises selecting a trial slowness, determining a flatness of a selected one of the horizons in a common image gather, applying a perturbation to the trial slowness, and repeating the determining the flatness and applying the perturbation until the flatness of the common image gather reaches a selected value.
- [c10] The program of claim 9 wherein the determining the flatness comprises determining a semblance between traces in the common image gather, wherein a maximum semblance corresponds to a maximum flatness.
- [c11] The program of claim 10 wherein the updating the velocity-depth model comprises replacing migration velocities with velocities obtained from the determining semblance of the common image gather and updating depth using the velocities obtained from the determining semblance.
- [c12] The program of claim 7 the logic further comprising steps operable to cause the computer to perform, repeating the residual migration velocity analysis in the depth-offset domain on a deeper horizon than the at least one selected horizon based on the updated velocity

depth model, and repeating the updating the velocity-depth model based on the repeated residual migration velocity analysis.